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ABSTRACT

For more than 20 years, Arizona's Maricopa Community College district has aggressively invested in and experimented with technology to improve teaching, learning, and the management of college and district services. However, Maricopa's leaders have acknowledged the ephemeral nature of its achievements in these areas and the need to keep reassessing their relationship to technology. Leaders in higher education are faced with the following competing views of the future of technology in education: (1) the future as cyber-freedoms (a model that is derived from the Internet and assumes that individuals can communicate in their own time, under their own conditions, and with everyone everywhere); (2) the future as collectives (a view defined by the special interests that drive policy direction and become more important than schools, governments, or universities); and (3) the future as media (a view based on the supposition that the media shapes global attitudes, causing our multicultural world to become increasingly monocultural). As new waves of technological change and competing views of the future continue to approach, Maricopa's leaders are continuing to reassess its relationship to and use of technology. Maricopa is currently orienting its technology future in two strategic directions: Internet-based software architecture and distributed learning systems. (MN)

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Crossroads of the New Millennium

Rival Views Of Technology: Leadership Lessons For An Uncertain Future

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Abstract

In the latter part of the 20th century, technology has been an extraordinary metaphor for, if nothing else, the advocating of change. The assumption has been that a large investment in technology, and a lot of technology to show for that investment, indicates that the investor is on the edge of change. However, technological innovations have not wholly assisted leadership in forming a clear view of the future or of the changes necessary to get there. Technology has suggested future positioning, but it has not, for unexplainable reasons, allowed us to generate a coherent future for higher education. Technology has impressed us with its dazzling momentum and its tumultuous nature, but it has hardly given us enough time to envision all of its implications.

At the front edge of a new century, higher education faces tremendous challenges in keeping pace with the progress of technology. Technology is one of the great drivers of the free market and of the learning revolution that is sweeping higher education. As traditional revenue sources shrink and competitive learning options increase, higher education is being shaken out of its traditional roles, modes of delivery, and patterns of organisation.

College leaders striving to maintain a technology edge must sort through rival views of the future to remain viable in the rapidly evolving education marketplace. Many of us who have been riding the waves of technology for a while are beginning to realize how precarious the surf can be. We are only beginning to learn our lessons from these experiences, and prominent among them is the importance of looking beyond artifact and glamour to the broader assumptions and implications connected to our use of technology.

Rival Views Of Technology: Leadership Lessons For An Uncertain Future

MARICOPA AS BOTH TECHNOLOGY PIONEER AND SCEPTIC

The Maricopa Community College District has enjoyed a premier reputation in technology accomplishments. For more than 20 years, we have aggressively invested in and experimented with technology to improve teaching, learning and the management of college and district services, and we have achieved a degree of success and acclaim. As we survey these achievements, we recognise their ephemeral nature and acknowledge that we must constantly assess and renew our relationships with technology in the expanding entrepreneurial educational marketplace.

Maricopa's technology achievements include several precedents. Maricopa was the first community college district to integrate voice, video, and data in a wide-area network covering all ten of its campuses. Maricopa developed the architecture of a distributive system when most other large community college districts depended on central processing units. Maricopa boldly built high tech centres the size of football fields, allowing all disciplines in a college to use one central facility for teaching and learning. Maricopa perfected open-entry/open-exit instruction with the use of pervasive technology support. Maricopa passed two significant bonds -- one in 1984 for $75 million and another in 1994 for $385 million. The latter was the largest bond passage in the history of community colleges, and $130 million of it was dedicated to technology purchases and acquisition. Maricopa leads the nation, perhaps the world, in offering the largest alternative delivery enrollment through Rio Salado College, one of the original "colleges without walls." Currently, over 400 sections are offered on the Internet, which, when combined with all other distance learning formats, contribute to enrollments of over 12,000 students in various alternative delivery courses, including telecourses, teleconferencing, and World Wide Web delivery.

Maricopa continues to invest in huge and bold application software experiments like our Learner-Centered Systems Project, which will place more power in the hands of students. In the future, students entering Maricopa's modules or courses will "own" their academic records. That is, students will have instant access to their academic and financial histories, and will be able to control their paths of probable career placement through greater information references and factual databases. In addition, Maricopa's concentration on network expansion and bandwidth capacity, as it builds one of the most sophisticated networks in higher education, holds great promise for bringing a world of discovery and learning to students' fingertips.

With this great promise come several assumptions about the changing nature of learning and the higher education market; these assumptions shape Maricopa's technology agenda:

1. In higher education, marketing will shift from production-driven processes to customer-controlled strategies. By this we mean that free markets will shift power to the students. Students will have spending power. Groups of students will eventually create alliances and purchasing cartels to offer their enrollments to the lowest bidders.
2. Because the learner is the centre of everything, the Maricopa Community Colleges are concentrating on designing distributed learning technologies.
3. Maricopa's arsenal of learning support features the integration of the Web, e-mail, video conferencing, groupware, simulations, news groups, distribution lists, chat rooms, instructional software, highly productive authoring labs, and multi-media production support. These technology applications become solutions to time, distance, and style barriers faced by the adult learner.
4. Places like the Maricopa Community Colleges are disadvantaged in the new marketplace in that they do not hold a monopoly on convenience. Colleges that enjoy what is called medallion status -- brand names like Harvard and MIT -- can now initiate Web courses or multimedia courses and invade the convenience market. Although access to public funds gives community colleges a fleeting monopoly as low-cost providers, the free market will probably cause the dissolution of that advantage as well. Thus, community colleges must offset the established cachet of premier institutions with learner services and easy access, asserting the commitment to place the learner first.

It seems no small irony that, as leading investors in technology, we find ourselves one of the more sceptical and tentative proponents of technology. At a recent conference of the American Association for Higher Education, I gave an address entitled, "Nervous on the Edge of Technology." My message was that although higher education leaders find themselves in a sea of enthusiasm for technology, much of that enthusiasm is unexamined. For example, attendance of 4,000 at a League for Innovation technology conference is not unusual, and great energy is generated in meeting rooms as hundreds of panelists and speakers demonstrate their wares and show their most recent triumphs. However, behind all this enthusiasm and the general euphoria for technology, whic[illegible]s fueled by the

vendors and marketers of that technology, is an eerie absence of a reason for buying the latest product applications.

The case could be easily made that most community colleges, as buyers of technology, have been "had" by the vendors. Consider these propositions in support of this allegation:

1. Vendors, both large and small, have had the corporate monopoly on Releasing product development in a way that keeps the consumers Constantly in the reactive mode, even though colleges spend millions of dollars for hardware acquisition and on applications software.
2. One of the industry's greatest hoaxes has been its "pushing out" of application software. Most community colleges will attest to having spent agonizing months, even years trying to correct and adapt bad product design to real-time applications in their colleges. In some cases, these applications serve such simple functions as admissions, records and the support of learning systems.
3. The computer industry is an industry that brags about its product efficiency, but it has no fundamental efficiency in the marketplace of users.
4. Often computer industries will create elaborate user groups on the Assumptions that the users have some sense of ownership of product development. However, many commercial vendors do not have a clue what users need or want.

Still, the challenges facing Maricopa and similar institutions worldwide continue to force higher education leaders to turn to industry and its vendors for guidance. The tremendous changes occurring in society, so intricately interlaced with technological advancements, have left leaders in the educational world unsure of the technological future.

MANY WAYS OF FORESEEING

What are some of the competing views of the future? I have argued that higher education does not have a coherent view of the future of technology; however, some views are emerging without higher education's help or involvement. Each view has implications for the role of technology, and each represents a different force that will undoubtedly be woven into the social fabric of the new millennium.

FUTURE AS CYBER-FREEDOMS

One emerging conceptual image of the future is that of cyber-freedoms, a model derived from the Internet. The coda for this model is that I can communicate on my own time, under my own conditions, and with everyone, everywhere. The editors of such publications as Wired magazine best espouse this emerging social view, with its images of the future that have a revolutionary tone and oppose large organisations like television networks, corporations, universities, government, and, particularly the United States Federal Communications Commission. The cyber-freedom model holds the following implications for individuals and nations:

1. Borders are redefined.
2. Nation states are less important than they have been.
3. Individuals feel more empowered that they have in the past.
4. States cannot be seen as responsible for as much as they once were.

In general, authority is being redefined in this view of societal progression. The state and the nation play lesser roles in our lives, and most autonomous, decentralised commerce is seen as a self-organisation, self-correcting improvement in economic practice. The metaphor of the Internet characterizes this new society: highly intuitive, highly self-organising, and highly empowered.

Evidence of cyber-freedoms as an emerging model that has the potential to impact higher education can be found not only among student populations, but also in the faculty ranks. In January, 1994, Bill Strauss, co-author of the 13th Gen, addressed our faculty at the annual All Faculty Convocation. Following Strauss' presentation, Vernon Smith, a 13th Generation faculty member at Rio Salado College, stood up in front of hundreds of faculty and strongly defended his generation. Using the following manifesto, Vernon spoke of how the 13th Generation, or Generation X, whose members are sometimes referred to as slackers, might view higher education:

- Truth is much more subjective than one might think. People, governments and professors have their own "spin" on truth.
- Information is not found in any single source or form.
- For the future, control and access to information is power.
- Show me how to get and use that access.
- Help me learn how to learn. Some instructors are no longer the source of information, of truth, they can take a more useful role as facilitators of learning, not the source.

- Don't bore me. If you are going to stand up and lecture me from your yellowing notes, put it on a disk , and I will take it home and read it on my time. Use an electronic forum or presentation -- music, video, computer-based tutorials, visual peripherals -- not just lecture.
- No ideas are new or unique -- there is nothing new under the sun.
- Pooled knowledge and appropriation are not plagiarism.
- Be explicit with your expectations in the classroom. I want to know all of the hoops you want me to jump through from the start.
- Teach me process, not content. Don't mark down my grade on a paper for a misspelled word (a content issue). Mark down my grade for forgetting to click on the spellcheck button (a process issue).
- Remember that I am strapped for time and out of money. Between the Mcjobs, school and play, I know where the payoff will be.

The ideas in the Generation 13 manifesto are being noticed. Perhaps Tony Carnavale (1999), Public Policy and Leadership Executive for the Educational Testing Service, describes the cyber-freedoms model most succinctly: "The new activists, who are often business people, have an almost pure interest in reforming education -- they have no concern about the politics of it or the cultural issues associated with modernisation" (1999).

Reform in cyber-freedoms fashion takes shape through connectivity, rapid evolution, and self-orgainsation. In a Wired magazine article entitled "New Rules for the New Economy," Kevin Kelly (1997) describes how connectivity is the essential currency of the cyber-future:

"Everything becomes connected -- billions and billions and billions of connections so the network redefines the economic premises of our lives. It drives all the new commerce, which is shorthand for connections....."

As we implant a billion specks of our thought into everything we make, we are also connecting them up. Stationary objects are wired together. The non-stationary rest -- that is, most manufactured objects -- will be linked by infrared and radio, creating a wireless Web vastly larger than the wired Web. It is not necessary that each connected object transmit much data. A tiny chip plastered inside a water tank on an Australian ranch transmits only the telegraphic message of whether it is full or

not. A chip on the horn of each steer beams out his pure location, nothing more "I'm here, I'm here." The chip in the gate at the end of the road communicates only when it was last opened: "Tuesday". (pp. 141-142) Kelly goes on to explain that this is a process of rapid evolution, and not all of this connection is going to occur overnight.

The whole shebang won't happen tomorrow, but trajectory is clear. We are connecting all to all. Every step taken that banks on cheap, rampant, and universal connection is a step in the right direction. Furthermore, the surest way to advance massive connectionism is to exploit decentralised forces -- to link the distributed bottom. How do you make a better bridge? Let the parts talk to each other. How do you improve lettuce farming? Let the soil speak to the farmer's tractors. How do you make an aircraft safe? Let the airplanes communicate among themselves and pick their own flight paths. In the Network Economy, embrace dumb power (p. 142). In the cyber-freedoms future derived from the Web, traditional boundaries become redefined as connectivity blurs the lines. Orgainsations, including nations, states, and governments become less important than individuals, and as power moves to the level of the individual, the processes by which we solve our problems become self-organising, self-empowered, self-connected.

FUTURE AS COLLECTIVES

A second emerging future is defined by the special interests that drive policy direction and become more important than schools, governments, or universities. The burgeoning power of such special interest collaboration is evidenced in the Beijing Women's Conference, the Rio Summit on the Environment, the Cairo Population Conference, and the Singapore Conference on Thinking. A future defined by the hegemony of such collectives implies that our connections and our collaborations drive more significant events in our lives than do the authorities to which we are normally responsible. No head of government could forge as expansive a women's agenda as the Beijing Conference, nor could the politics be as local as actual issues women face in their families, their villages, their communities, their religious environments, and their countries. Reflecting the pervasive power of some religious collectives, the Cairo Population Conference broke down when population control became the central agenda issue.

More, the future as defined by special interest collectives will find the coalescing of groups along lines that ignore conventional boundaries. As we become more globally interdependent, individuals

will move about the world, fashioning business and personal bonds within the new international community. The growing world-wide eco-consciousness, which is stimulating international responses to traditionally national decisions about levels of pollutants and consumption of natural resources, hints at the power potential in the new collectives.

FUTURE AS MEDIA

Still another prospective can be envisioned as a media-defined future. This future presupposes that media shapes global attitudes because of similarities and tastes in music, film, art, food, clothing and lifestyles translated through shared media-based experiences. Today, approximately 800 million teenagers around the globe listen to the same sitar, rock n' roll, steel band, Reggae music, and video productions. Madonna, R.E.M., and other international entertainers set cultural standards around the world. In many ways, our multicultural world is becoming increasingly monocultural through the effects of mass media. The media-based collective model of the future is more youth-centred, and its tastes, desires, interests, and perceptions are created by and reflected in television, film, video, music and other ubiquitous media. Standards of sound and visual quality are extremely advanced. Young people demand a high fidelity, high resonance, and quality standard that determines the basis on which they will receive information. They have lived with the highest video standard we have ever known.

Global acculturation to media is staggering. Increasingly, the media define our accepted limits of violence, drama, romance, heroism, and even love, yet few technology planners take into account the homogenising effects of global media. No doubt, positive futures could be projected as well as the negative ones that are predicted. Again, here rests the potential for building an even more coherent future for technology. If teenagers are listening to the same sitar, alternative, hip hop, steel band and rock n' roll music, then they are at the same time seeing the same signature clothing ads and resonating to the same general values of love, romance, heroism and increasing violence. Just as Reggae and rock have fused, so have the youth cultures. This youth phenomena may have more implications than any other alternate future. It has shaped and will continue to shape massive global, commercial, economic, and market policy. For a country like the People's Republic of China, which exports 80 per cent of the global clothing market, the implications are staggering.

Finally, in considering how a collective mental view of a future can shape destiny, I turn to the example of the 1939 New York World's Fair. The 1939 World's Fair is an excellent example of how a single event helped shape an entire era, in this case perhaps five to six decades of a country's values and culture. The vision proposed at the 1939 World's Fair, during a troubled and shaky time in US history was of a better standard of living, beneficial modernism, suburban optimism, unlimited consumption, and the massive modification of American products. The promise of technology for a good life -- first the automatic washing machine and dishwasher, then the microwave -- changed America in profound ways that, perhaps, were not foreseen. Americans drew a new national identity from the fair's utopian visions and promise of prosperity for the common man. From this new ideology, the US colonised the future with a standard of technology and consumerism that has lasted 60 years.

SIFTING THROUGH THE FUTURES

As new waves of technological change and competing views of the future approach, I ask only that we examine our technology revolution in more thorough ways. The 1939 World's Fair is illustrative of an extravaganza building upon a hopeful vision. It drove future decades of consumption and unprecedented material pleasure. At the World's Fair, people visited massive pavilions illustrating a happy, hopeful future of freeways, automated machinery and conveniences in the home that would allow new leisure and a more pleasurable existence. At the time, Europe had entered World War II and America clung to a hope of peace; two years after the Fair, that hope was completely shattered. After the war, the American people renewed their commitment to the images of peace and prosperity they saw at the 1939 World's Fair. In a sense, these images colonised the future. America's imperial destiny, as played out in the moon landing and the NASA space shuttles, was marked with the long-term effects and the unpredicted fall-out of technological imperialism.

One cannot blame all of our social ills on a blind commitment to technological development, but that development has contributed to our current struggle with the complexities of poor air and water quality, overcrowded cities and unsafe neighbourhoods. We have saddled ourselves with social problems that possibly could have been avoided by envisioning a different future. Too often, the influential and powerful do not see much beyond technology's euphoria and dazzling momentum, which they mistakenly identify as progress.

At a League for Innovation Conference on Information Technology in November, 1996, which attracted 3,600 participants, I presented a video-assisted speech that outlined the consequences of five decades of unprecedented expansion, development, and consumerism -- all riding the crest and glories of technology. This video's closing metaphor is the depiction of the seemingly bottomless swamp of the Fresh Kills Landfill in New York, which by height and depth exceeds the elevation of Denver. Fresh Kills is the highest point of elevation among the New England seaboard's land masses and by 2010 will reach more than six miles in height and width. This manmade mountain is testimony to the unforeseen effects of our rampant consumerism and technological progress. The social critic and artist-in-residence for the New York City Sanitation Department, Marian Laderman Ukeles, is using Fresh Kills in creative ways to communicate the effects of our technology decisions. At the Marine Transfer Station in Lower Manhatten, Ukeles presents "Flow City," a multimedia collage of technological accomplishment and waste, not unlike a Jackson Pollack painting. A block-long tunnel made of recycled materials presents cross-cuts of the waste of two or three generations, from our infatuation with the acrylic world -- hula hoops, old toothpaste containers, broken bottles, and bean cans -- to the more recent throw-away society of old Apple II computers, broken television tubes, and Radio Shack modems. At the Glass Bridge, visitors can see and hear the dumping of new waste as it arrives. As the compression chambers crush the technology we threw out last year, a wonderful cacophony echoes the theme repeated in the symphony of technology progress during the last several years. A Media Flow Wall with 24 television monitors shows us videos and live camera shots from Fresh Kills.

Ukeles' artistic treatment of our technological byproducts is meant to be instructive for touring children. As they visit the Manhattan Transfer Station, they can see that our habits of consumption are not someone else's, but are the result of our own decisions about what we value, what we purchase, and what we throw away. Through an artist's view, school children can see the past and its influence on the future.

TECHNOLOGY FUTURE AT MARICOPA

The technology beat goes on at Maricopa. We continue marching. While we have been described as visionary, we have also heard more sobering arguments that call for our perspective of a more coherent future. We are only beginning to learn our lessons from these experiences, and high among them is the importance of looking beyond artifact and glamour to the broader assumptions and

implications connected to our use of technology. Based on the overarching assumptions described previously, Maricopa is orienting its technology future in two strategic directions:

1. Internet-based software architecture, and
2. Distributed learning systems.

Implementation activities are underway in both areas.

INTERNET-BASED SOFTWARE ARCHITECTURE

Ron Bleed (1997), Maricopa's distinguished Vice Chancellor for Information Technology, outlines the rationale for adopting a browser-supported platform in his comprehensive report, "Innovation Advantages for New Realities." Among the advantages Bleed outlines are ease of adaptation, flexibility, multi-media integration, Internet protocol, and, most critical, the shift to more learner-centred control of information:

The new software architecture is rules-based and built with objects. Ease of changes, purchasing new features through the objects, and integration to other software provides the needed ability to keep the software changing with changing needs in Maricopa. In the atmosphere of ten autonomous colleges, Maricopa will be well served by this flexibility. In the future era of rapid change and integration with other orgainsations, Maricopa will need software with those same attributes. The Internet architecture is another cornerstone for new systems.

The Internet has merged video and audio with the computer media. Browser-oriented software language is the great integrator of multi-media which makes it the vehicle for the new learningware developments. Browser-oriented computing involves a decision shift from a desktop centric model to a network centric one. Internet-based software has the potential to fundamentally change the way information systems are constructed, managed and used. As everyone connects to the Internet, whether they are faculty or students, and begins to exchange information, we will need software that puts education on-line. At the present timeline, Maricopa will be among the first colleges to have an internet-based, programmed student information system. The reengineered design specifications for creating a learner-centred system are a perfect fit for Maricopa's strategy (p. 9).

DISTRIBUTED LEARNING SYSTEMS

The second innovation advantage that Maricopa currently holds is its commitment to distributed learning systems. A Centre for Distributed Learning, is planned for more than one of our colleges, with Mesa Community College as the first. The online description of the Centre for Distributed Learning offers this definition:

"(Distributed learning uses) a wide range of information technology to provide learning opportunities beyond the bounds of the traditional classroom. Some examples of distributed learning technologies include the World Wide Web, e-mail, video-conferencing, groupware, simulations, news groups, distribution lists, chat rooms, MOOs, and instructional software. A distributed learning environment facilitates a learner-centred educational paradigm and promotes active learning. "

As Maricopa evolves into an elaborate system of help desks, call centres, and course facilitation, three to four thousand courses could end up on the Internet within the next two years. We are currently doubling Internet courses every semester. As Linda Thor, President of Rio Salado Community College, frames it, "Maricopa does not have courses up on the Internet; it has, in Rio's case, the whole college." This new education delivery system, however, does not preclude the omnipresent need for support of student learning. Studies of online learning at Maricopa reveal that the best predictors of student success in Internet-based courses is a faculty phone call to the student during the first week of classes. Our experiences validate what we have always suspected: technology very seldom stands alone. Elaborate support systems are needed to brace technology and are analogous to an iceberg in that technology is only the tip; underneath good technology are massive student support and increasingly intricate, self-organising networks of learning communities.

EPILOGUE AND GENESIS

This paper does not offer many solutions. Instead, it begs higher education to develop a more coherent vision of technology and asks that we not simply ride out its crests, waves, rivulets, and surges of progress. It calls not only for being impressed with technology's dazzling momentum, and its tumultuous nature, but also for positioning and, at times, offering counterpoint to the technology solutions with which we seem so enamored. I like Kevin Kelly's (1997) call for the "devolution" as well as the "evolution" of our orgainsations:

You've got to clear out the top of your orgainsations and you have to be ready to push back down into the valleys when you have reached the top of your peak. We have not learned to devolve our orgainsations very well and most orgainsations only have a short life at their highest point. They have to learn to devolve to the lower valleys and build the uphill path to even greater and different achievements (p. 192). Ever so slowly, we are learning to undo and recreate ourselves at Maricopa. To be great at technology, we must also be critics of technology. We must look beyond the artifact stage of technology. Computers, in a sense, are passé. The massive amount of commerce generated by the Internet is making technology ever more pervasive, ever more self-organising, and ever more creative. We hope that Maricopa is rejecting the mode of simply buying technology and adopting the mode of critiquing, envisioning, and creating it. We also hope that major users of technology, like the community colleges, will band together to create purchasing cartels that will help stop the blind commercial exploitation of users. Too often, community college users buy inferior products rather than find their own solutions and define their own destinies. Developing products that meet community college needs is almost always better than purchasing "shrink-wrap" products that are offered commercially.

Ironically, we are passing through these millennial years at a time when today's mission-critical software is only newborn; at this writing, for example, Netscape is barely a few years old. We are in a position in the development of our civilization where we have discoveries that make the invention of the printing press seem small. We know what the printing press did to change the progress of civilization; is it not a wonder that we do not have an engaging view of the future for technology that really projects what its true and hopeful potential can be? We need that vision and we need that coherent view. Colleges riding the tsunami of technological change must recognise the absurdities of our old Cartesian views of the universe, look for larger patterns, and lift our technology agendas to fulfill the egalitarian mission we symbolise. Our new utopian future for technology applications rest in a learning-centred ideal. The agendas prescribed by all the alternate futures call for technology that allows the learner to rule. Whether responding to a future defined by cyber-freedoms, special interest collectives, or a media-defined youth culture, we must use educational technology to liberate the learner or we will find ourselves prisoners of the past. At the same time, we must engage the human and organisational possibilities of technology to uphold our values of community and social responsibility. Let us hope that the vision for such a future is clear to our leaders.

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